OCED
Office of Clean Energy Demonstrations

THE OFFICE OF
CLEAN ENERGY DEMONSTRATIONS

Midwest Region
Long-Duration Energy Storage Regional Briefing

10/03/2023

Office of Clean Energy Demonstrations

U.S. Department of Energy

Welcome!

Welcome & Meeting Objectives

- The Office of Clean Energy Demonstrations (OCED) at DOE recently announced the selection of nine long-duration energy storage projects, which include at six locations in the Midwest region of the country
- We at DOE wanted to connect to help clarify our process and the opportunities to plug in and help shape your community's energy future
- Engage with DOE and the commercial partners involved in these long-duration energy storage demonstration projects

Introductions

Emmanuel Taylor

Facilitator

Juan Alvarez,
LDES
Program Manager,
Project Management,
OCED

Marcela Mulholland,
Stakeholder
Engagement Lead - LDES,
Engagement Office,
OCED

Opening Remarks

Agenda

- 5:00 – 5:05 | Welcome
- 5:05 – 5:10 | Opening Remarks
- 5:10 – 5:15 | OCED 101
- 5:15 – 5:20 | LDES Overview
- 5:20 – 5:25 | Community Benefits Plan Overview
- 5:25 – 5:55 | Project-Specific LDES Overview
- 5:55 – 6:00 | Next Steps & Opportunities for Engagement
- 6:00 – 6:25 | Feedback Session
- 6:25-6:30 | Wrap-Up & Close

*Times are in CST

OCED Overview

OCED Mission

Deliver clean energy technology **demonstration projects at scale** in partnership with the **private sector** to **accelerate deployment**, **market adoption**, and the **equitable transition** to a decarbonized energy system.

OCED Mandate

SCALE EQUITABLE, CLEAN ENERGY

Help enable 100% clean electricity by 2035 and net zero emissions by 2050 through an equitable energy transition

UNLOCK NEW INVESTMENT

Unlock and scale trillion-dollar clean energy follow on investment from the private sector and other sources of capital

DE-RISK TECHNOLOGY

Maintain risk-based, balanced, and defensible portfolio of investments

SERVE AS CENTER OF EXCELLENCE

Serve as primary DOE office to deliver full scale clean energy demonstration projects and project management oversight excellence

ENGAGE & COLLABORATE

Leverage private sector and broader energy ecosystem to inform OCED and DOE technology commercialization efforts

OCED Scope

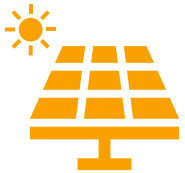
- Regional Clean Hydrogen Hubs ($8 billion)
- Advanced Reactor Demonstrations ($2.5 billion)
- Carbon Management ($7 billion)
- Industrial Demonstrations ($6.3 billion)
- Long-Duration Energy Storage Demonstrations ($505 million)
- Energy Improvements in Rural or Remote Areas ($1 billion)
- Clean Energy Demonstrations on Mine Land ($500 million)
- Other Initiatives ($133 million)

Long-Duration Energy Storage (LDES)

Why Long Duration Energy Storage

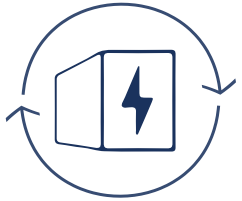
Cheaper, longer energy storage can:

Support the **expansion of renewables** like solar and wind by providing stability, flexibility, and optionality to the grid



Reduce the need for new fossil fuel capacity by **firming renewables**

Enhance **resiliency of the grid** and at critical facilities (e.g., hospitals, affordable housing) **during extreme weather** and other disruptive events

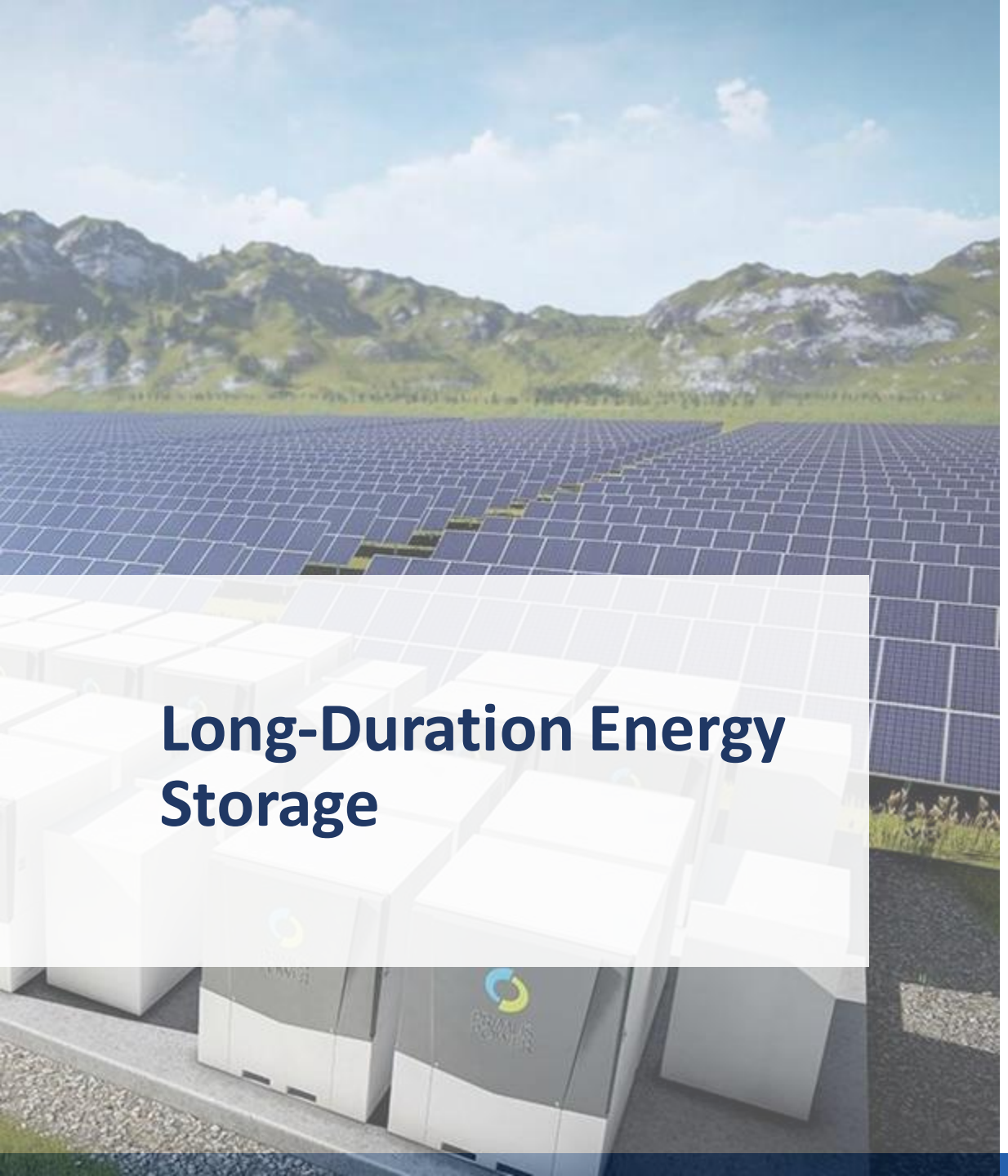


Diversify the domestic energy storage **supply chain**

Overview

- As we move towards a power grid that relies on more variable energy, **the need for LDES is critically important.**
  - Of the 1,325 current energy storage projects in North America, only 25 (or 2%) have duration of over 10 hours.

- The projects announced last week will help increase the **availability and market viability of LDES** and facilitate the deployment of clean, reliable energy across the nation.
  - The nine (9) projects selected for award negotiation include collaborations among communities and businesses, tribal nations, utility providers, hospitals, clean tech entrepreneurs, labor unions and retirement communities.



Long-Duration Energy Storage

Energy Storage: The capture of energy produced at one time for use later to reduce imbalances between energy demand and energy production.

LDES: Energy storage systems capable of delivering electricity for 10 hours or longer.

OCED's LDES Demonstrations:

Aims to fund projects that will overcome the technical and institutional barriers that exist for full-scale deployment with a focus on a range of different technology types for a diverse set of regions.

Current Status:

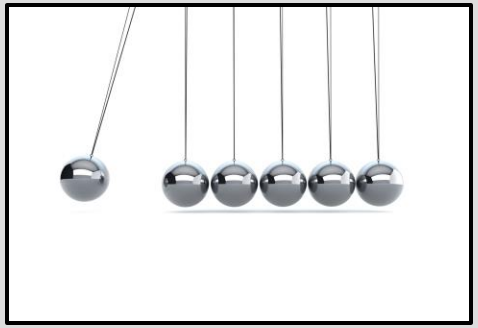
- **September 22, 2023: <u>DOE announced nine projects selected for award negotiations.</u>**

Types of LDES Technology Selected

Mechanical

Compressed carbon dioxide (CO_2) energy storage

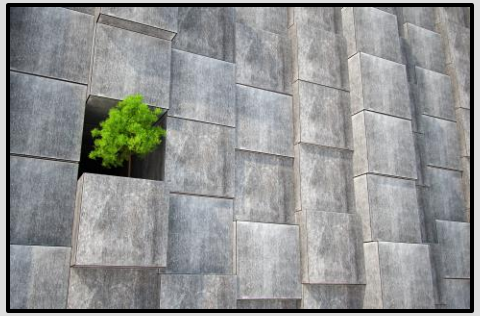
- Stores electric energy in the form of potential energy (compressed CO_2).



Thermal

Sensible heat storage

- Turns grid electricity into heat using large-scale heat pumps. Heat is stored and used to generate power when needed.



Electrochemical

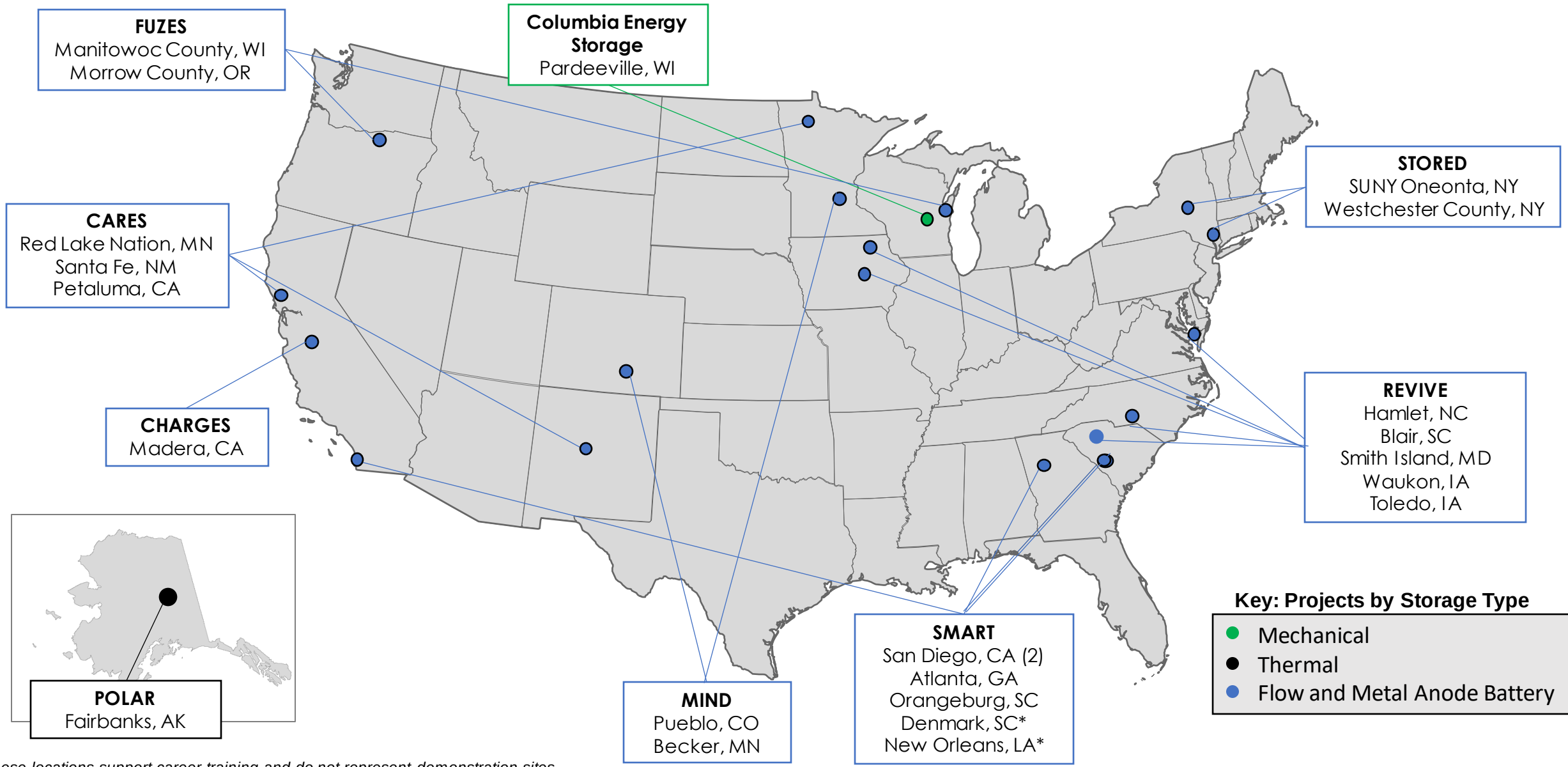
Flow batteries

- Uses liquid positive and negative electrode material stored in tanks. Fluids flow past reaction site to produce power. Effectively decouples energy and power.

Non-flow batteries

- Similar to a car, phone, or rechargeable AA batteries.

Selected Project Locations



*These locations support career training and do not represent demonstration sites.

Phased Approach to Project Management

Community Benefits Plans

Prioritizing Community Benefits in OCED Projects

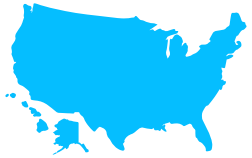
OCED **requires** applicants to include a Community Benefits Plan (CBP) to help ensure broadly shared prosperity in the clean energy transition.

By **prioritizing community benefits**, we can ensure the next chapter in America's energy story is marked by greater justice, equity, security, and resilience.

Community & Labor Engagement

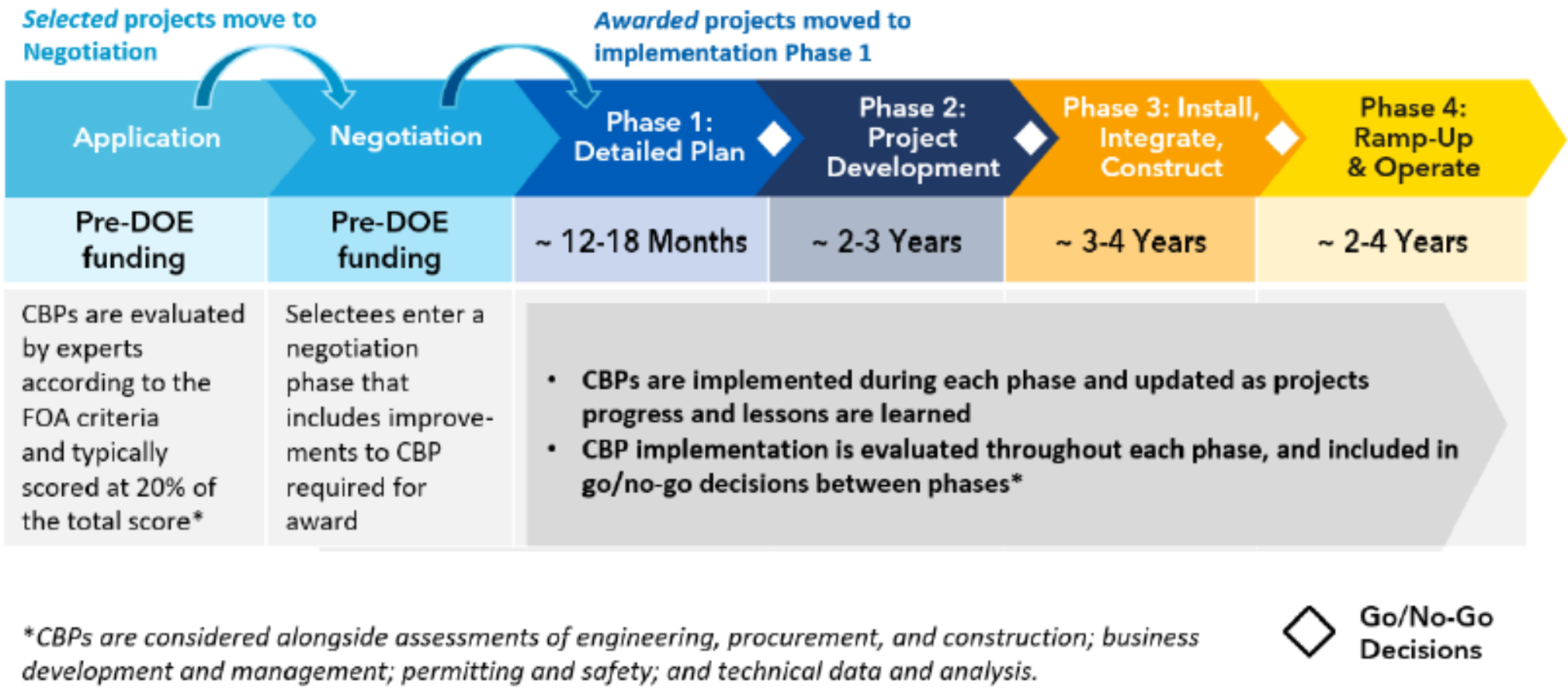
Diversity, Equity, Inclusion, & Accessibility

Investing in the American Workforce



Justice40 Initiative

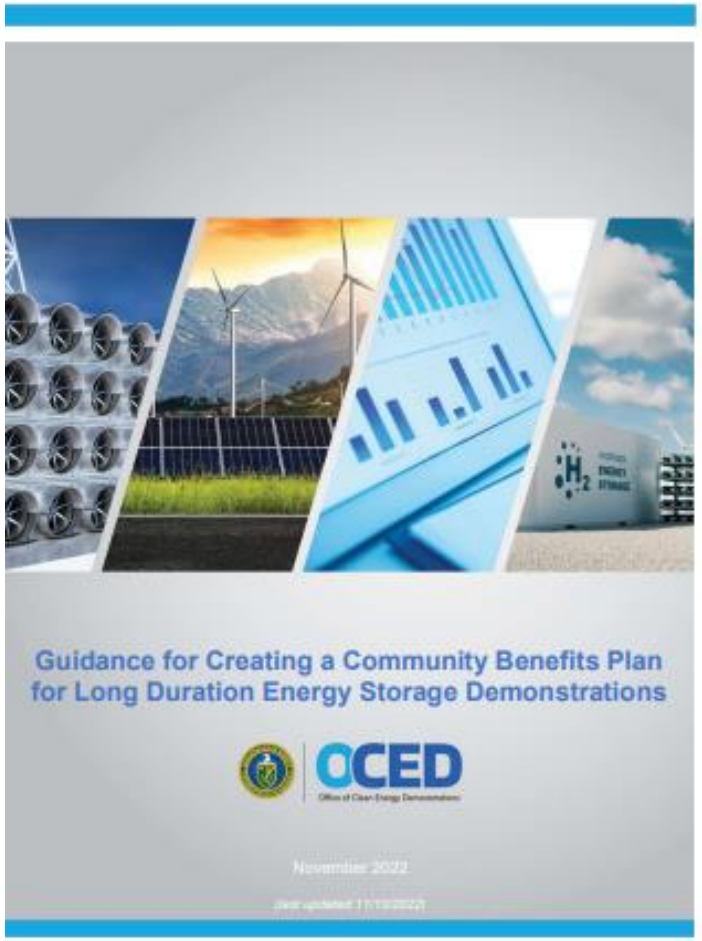
Community Benefits Plans - Implementation Requirements per Phase



**CBPs are considered alongside assessments of engineering, procurement, and construction; business development and management; permitting and safety; and technical data and analysis.*

Strong CBPs

- Demonstrate moving beyond a vision or assessment into **actionable goals, outcomes, and implementation steps** supported by adequate money, people, and time resources
- Include mechanisms for **accountability to and transparency with** impacted communities
- Propose clear **metrics** to measure success
- Match proposed actions to the **needs and priorities** of impacted communities
- Robustly address all four topic areas
- **Minimize and mitigate negative impacts** and harm, especially to already overburdened communities
- **Create good-paying jobs**, equitable access, and invest in workforce development



OCED FOA CBP Guidance docs available with each FOA at: https://oced-exchange.energy.gov/

Project Overviews

Communities Accessing Resilient Energy Storage (CARES)

- **Prime:** ReJoule
- **Location(s):** Red Lake Nation (Minnesota)
- **LDES Technology:** Second Life EV Batteries
- **Highlights:**
  - Makes use of retired batteries from electric vehicles
  - Provides demand reduction, load shifting, and resilience at two affordable housing complexes and a Red Lake Tribal Nation tribal workforce development campus
  - Engages a nonprofit to build career pathways in clean energy technology for youth, women, and individuals

Rural Energy Viability for Integrated Vital Energy (REVIVE)

- **Prime:** National Renewables Cooperative Organization (NRCO)
- **Location(s):** Iowa
- **LDES Technology:** Vanadium Redox Flow Batteries
- **Highlights:**
  - Will develop a Rural Behind-the-Meter LDES Cooperative Network, comprised of vanadium redox flow batteries with discharge capabilities of up to 20 hours
  - Batteries will be located at three to five sites across the Midwest, Southeast, and Mid-Atlantic regions of the United States
  - Aims to deliver high-benefit, low-risk energy solutions to vulnerable and disadvantaged rural areas with associated workforce training

Oct. 2 – 3, 2023

Long-duration energy storage project

Jeff Plew, Executive Director Development

NEXTera ENERGY RESOURCES

NextEra Energy is a clean energy leader

Composed of two primary businesses

NextEra Energy, Inc.

- Fortune 200 company[1]
- 95-year track record
- $21 B operating revenue[2]
- 67 GW in operation [3]
- NYSE: NEE

NextEra Energy Resources, LLC

- World's largest generator of renewable energy from the wind and sun
- 34 GW net generating capacity[2]
- Operating in 40 states & Canada[2]

Florida Power and Light (FPL)

- One of the largest US electric utilities[2]
- 5.8 MM customer accounts[2]
- 31 GW net generating capacity[2]

1. Fortune's 2023 Rankings
2. As of 12/31/22 Annual Report 2022 Form 10-K
3. Gigawatts shown include assets operated by Energy Resources, including those owned by NextEra Energy Partners as of 3/31/23; excludes assets which have been sold parties but continue to be operated by Energy Resources. Investor Report 2022.

NextEra Energy's Real Zero™ goal

Our goal is to be completely carbon emissions free by no later than 2045

1

Decarbonize our own business, beginning with our goal to reach Real Zero emissions, without the need for carbon offsets, by no later than 2045. We've been prudently investing in decarbonizing our own operations for decades and this is an extension of our core values.

2

Decarbonize more of the U.S. power sector – investor-owned utilities, municipalities and cooperatives – through continued investments and innovation in wind, solar, storage and green hydrogen projects.

3

Lead the decarbonization of the U.S. economy – by working to become the preferred partner for customers to help them reduce or eliminate carbon emissions in their operations. We use our experts and data analytics to help our commercial and industrial customers reach their own net zero or strive to achieve Real Zero goals.

Our Real Zero™ efforts will utilize a variety of clean technologies, with long-duration energy storage playing a key role in reaching our carbon emissions free goals

Long-Duration Energy Storage Pilot

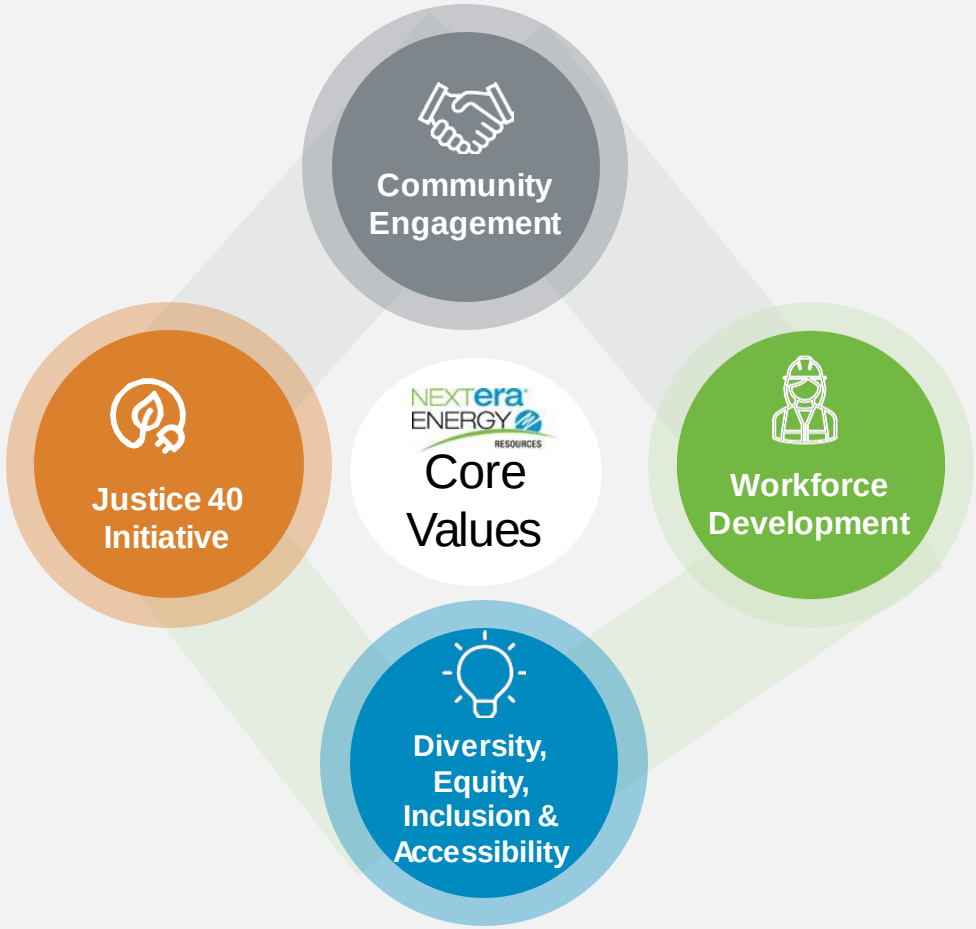
NextEra Energy Resources was selected to evaluate and demonstrate the viability of non-lithium battery technology for long-duration battery energy storage systems

Highlights:

- Pilot efforts will include development and deployment of several 10-hour duration battery energy storage projects using an aqueous zinc-bromine technology.
  - The proposed battery technology is safe, non-flammable and made in the U.S. with domestically sourced materials, limiting supply chain challenges.
- Proposed deployment at several sites in the Pacific Northwest and Upper Midwest – each of which have operational wind and/or solar facilities.
  - The expected benefits include increased capacity at the point of interconnection, reductions in green-house gas emissions, enhanced grid reliability, improved utilization of renewable energy generation facilities and lower future energy costs.

Corporate Community Benefits Program: Building strong relationships and supporting the communities we serve

Partnering with local technical and community colleges to advance student readiness for good paying jobs and careers in the energy sector.



Community Engagement

Develop community partnerships

Listen to local stakeholders

Follow through on our corporate values

Workforce Development

Renewable energy camps

Straight to work initiatives

NextEra Energy internship program

Diversity, Equity, Inclusion & Accessibility

Employee Resource Groups

Veterans

Supplier diversity

Justice 40 Initiative

Increase clean energy

Increased energy resiliency

Decreased environmental burden

Columbia Energy Storage Project

Raja Sundararajan – EVP, Strategy and Customer Solutions
JP Brummond – VP, Customer and Community Engagement
Mike Bremel – Director, Engineering and Customer Solutions

October 3, 2023

Columbia Energy Storage Project

- **Project Objective:** Integrate a Long-Duration Energy Storage (LDES) solution at an existing energy campus and demonstrate the feasibility of the LDES solution for broader implementation.

- **Solution:** 20 MW/200 MWh carbon dioxide-based (CO2) energy storage system designed by Energy Dome.
  - Project will be the first-of-its-kind CO_2-based energy storage system in the United States.
  - This innovative and efficient approach to long-duration energy storage will enable a more sustainable, reliable and cost-effective energy future.
  - The system can power approximately 20,000 Wisconsin homes for 10 hours.

- **Location:** Town of Pacific, Columbia County, Wis., near the current Columbia Energy Center.

- **Timing:** Expect to submit project plans to the Wisconsin Public Service Commission in early 2024. Pending approval, construction could begin in 2025 with completion in 2026.

ENERGYDOME
Our WORLD can't wait.

Alliant Energy

Our Clean Energy Vision

By 2030: achieving a **50%** reduction in CO_2 emissions from 2005 levels.

By 2040: eliminating all coal from our generation fleet – **10** years faster than our previous target.

By 2050: meeting an aspirational goal of **net-zero** CO_2 emissions from the electricity we generate.

Additional information can be found in our Corporate Responsibility Report: alliantenergy.com/responsibility

Community Benefits Plan and Engagement

Essential to establishing workforce readiness framework for engaging **low-income and Tribal communities**, the most energy-burdened people near the Columbia Energy Center.

The University of Wisconsin-Madison Clean Energy Community Initiative (CECI):

- Lead future community-led and solution-focused discovery meetings with organizations representing additional under-represented groups within Wisconsin.

Madison Area Technical College (MATC):

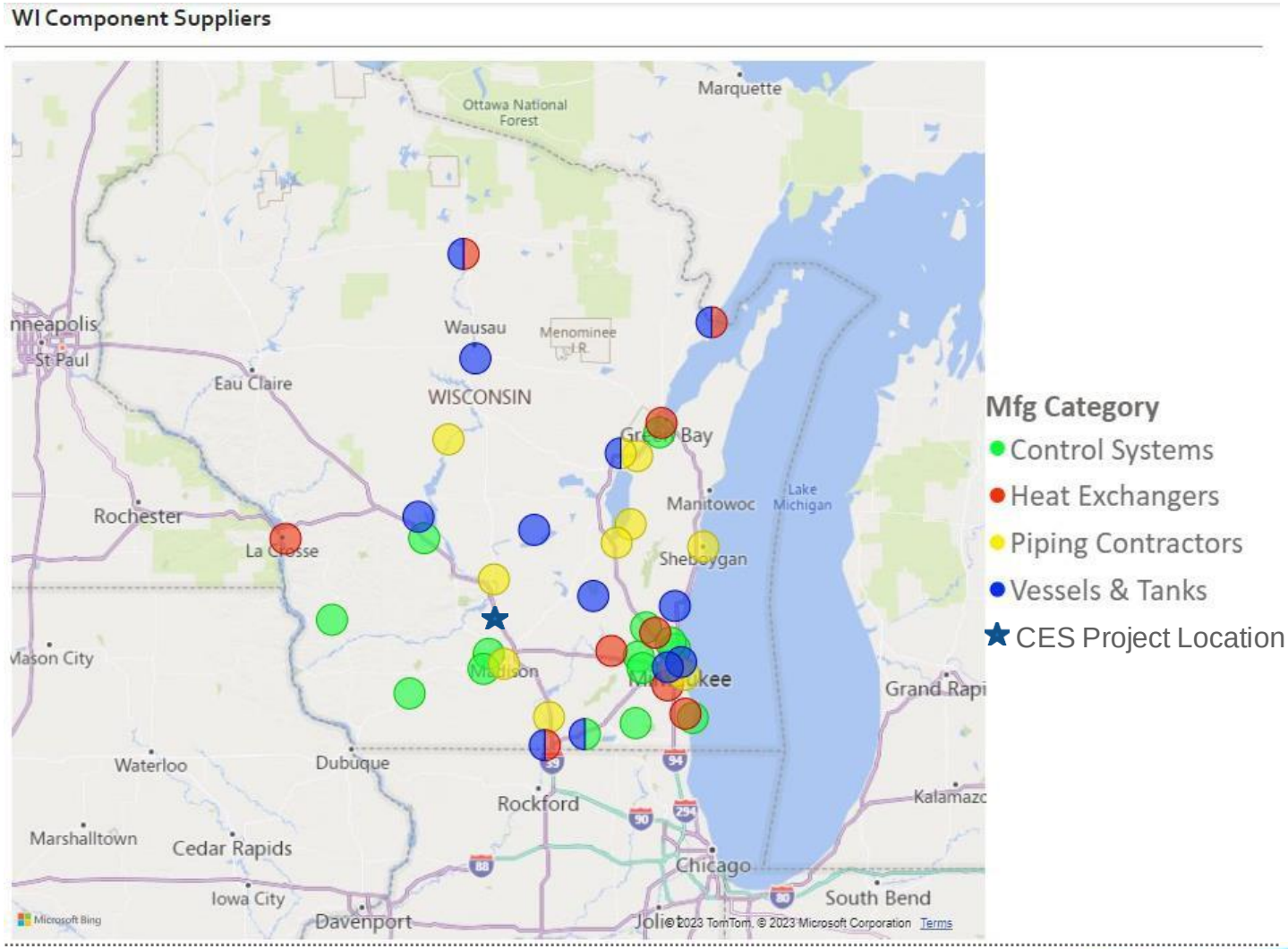
- Lead renewable energy workforce training and provide apprenticeships and certificates for the community.

To realize **Justice40** intended environmental justice benefits, two-way engagement activities will be geared toward **Black, Latino, Tribal, low-income, and rural energy-burdened communities**. Participants will:

- Support meaningful community and labor engagement
- Invest in America's workforce
- Advance diversity, equity, inclusion, and accessibility
- Contribute to the President's goal that 40% of the overall benefits of certain federal investments flow to disadvantaged communities

Economic Development Opportunity

- Alliant Energy and Energy Dome are working collaboratively to identify potential Wisconsin-based supply chain companies.
- Initial outreach and engagement is forthcoming in next few weeks.
- Leveraging the strength of Madison College and Wisconsin's Technical College System, this project will provide unique workforce development and apprenticeship opportunities.



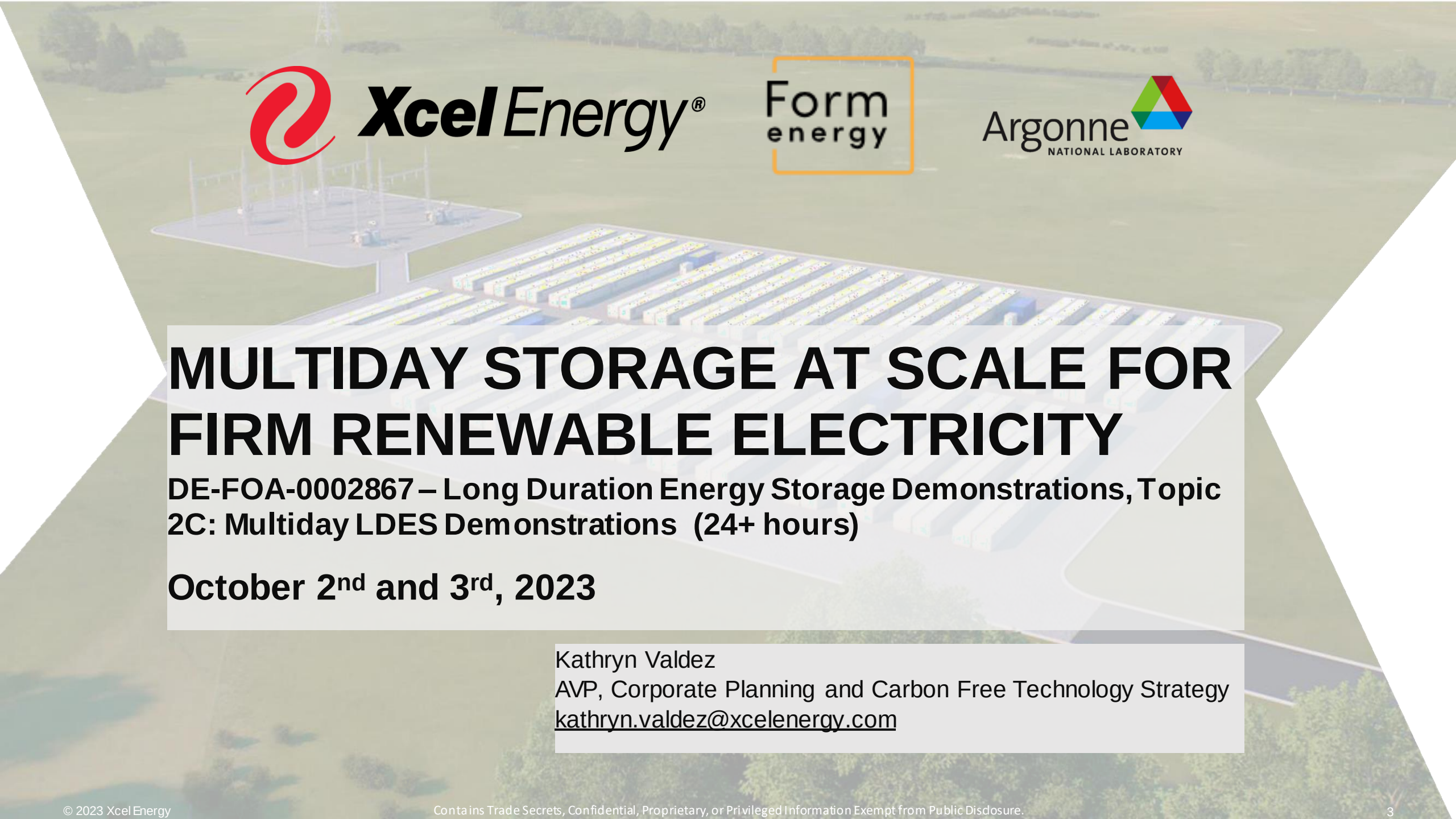
Powering Beyond

The Columbia Energy Storage Project delivers on our purpose-driven strategy to **serve customers** and **build stronger communities**.

- Increases economic development and spurs energy innovation.
- Leverages and builds upon our historic investments in Columbia County.
- Strengthens system resilience and reliability.
- Reduces energy burden and drives value for customers.

This project represents an incredible opportunity to advance the goals outlined in our Clean Energy Vision and build toward a more sustainable, reliable and affordable energy future for all.

Learn more at: alliantenergy.com/ColumbiaEnergyStorage



MULTIDAY STORAGE AT SCALE FOR FIRM RENEWABLE ELECTRICITY

DE-FOA-0002867 – Long Duration Energy Storage Demonstrations, Topic 2C: Multiday LDES Demonstrations (24+ hours)

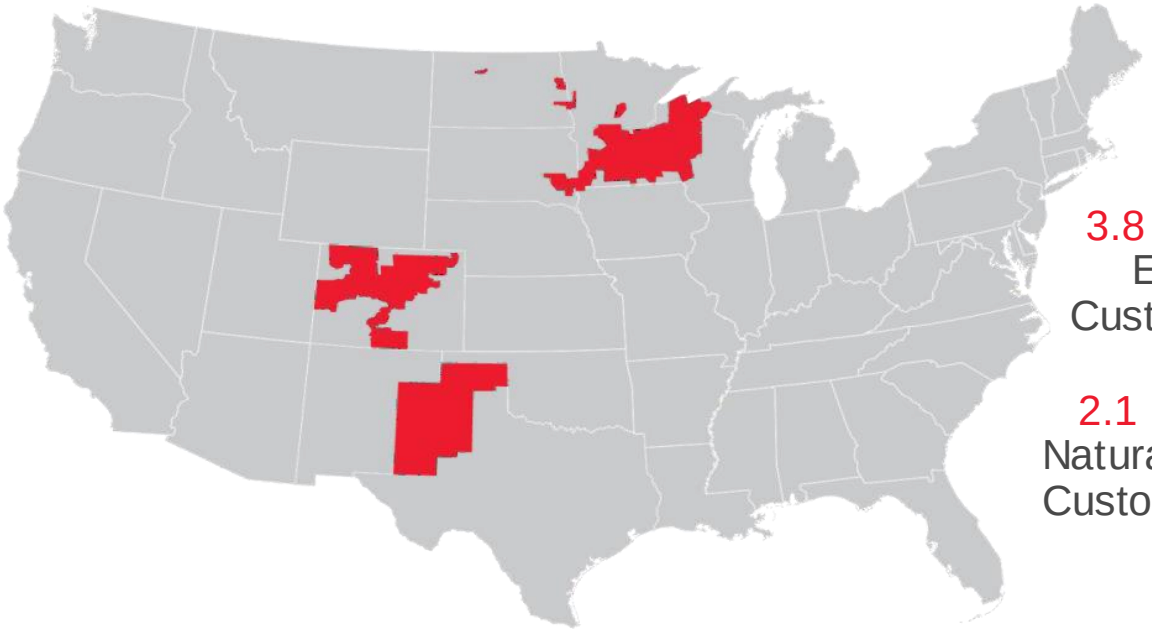
October 2nd and 3rd, 2023

Kathryn Valdez
AVP, Corporate Planning and Carbon Free Technology Strategy
kathryn.valdez@xcelenergy.com

Project Overview

Deploy Multiday Storage (MDS) Systems, 10 MW / 100-hour discharge, at two retiring coal plants

Xcel Energy operates in 8 states and serves our communities with over 11 GW of renewable energy. Long duration energy storage is a strategic solution to provide our customers with carbon-free electricity by 2050.

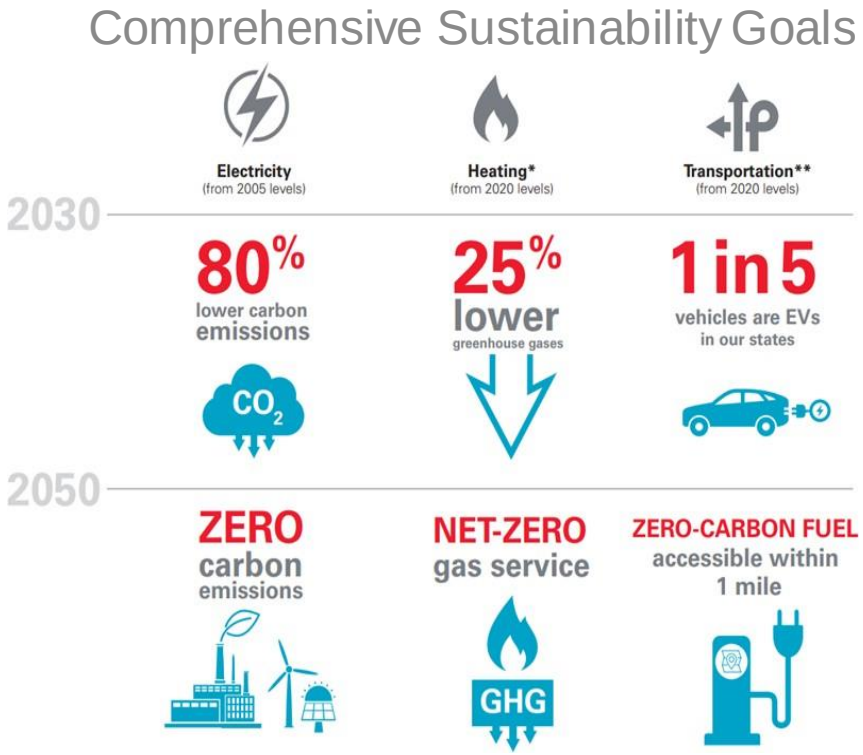


3.8 Million Electric Customers

2.1 Million Natural Gas Customers

Project Objectives:

Accelerate deployment of LDES via strategic partnership, technology, & scale



Strategic Partnership

Together, we can accelerate deployment of LDES at scale

Xcel Energy®

Deploy & Operate

Who: Regulated utility with large renewable portfolio and aggressive decarbonization goals

What: Deploy two multiday storage systems connected to the Bulk Power System

Role: Project Developer and Grid Operator

Form energy

Develop & Manufacture

Who: A startup leading the field of LDES

What: Scale manufacturing of iron-air batteries, TEA-LCA, collaborate on CBP

Role: Vendor (Technology provider for 100-hour duration iron-air batteries & LDES analysis software)

Argonne NATIONAL LABORATORY

Value & Validate

Who: World recognized research institution delivering end-to-end leadership in battery technology, markets, workforce, and Justice40

What: Validate and show LDES value, collaborate on CBP

Role: Subrecipient

city of PUEBLO colorado

THE CITY OF BECKER MINNESOTA

Transition & Grow

Who: Communities, workers, beneficiaries of clean energy

What: Provide project input & collaboration

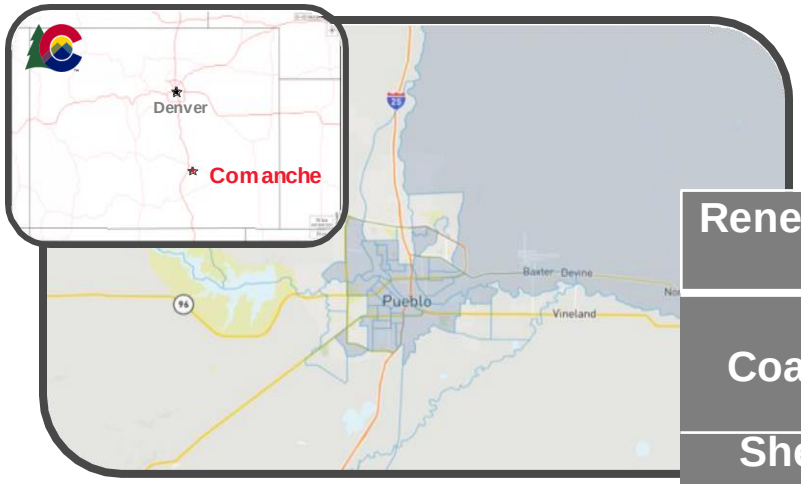
Role: Stakeholders

Community Project Locations

Deploy Multiday Storage (MDS) Systems, 10 MW / 100-hour discharge, at two retiring coal plants

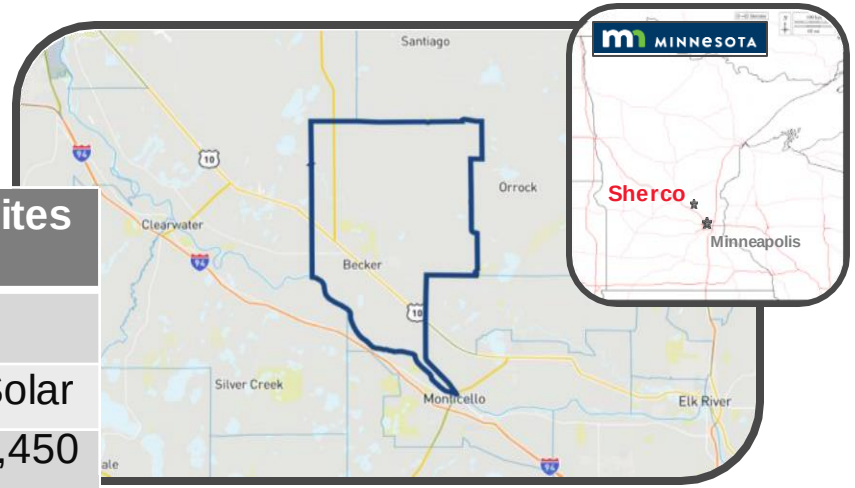
Pueblo, Colorado

- Population: 111,000
- Comanche 1,100 MW coal generation plant retires 2030
- Designated as a DAC
- Pueblo Generation Study & Advisory Group

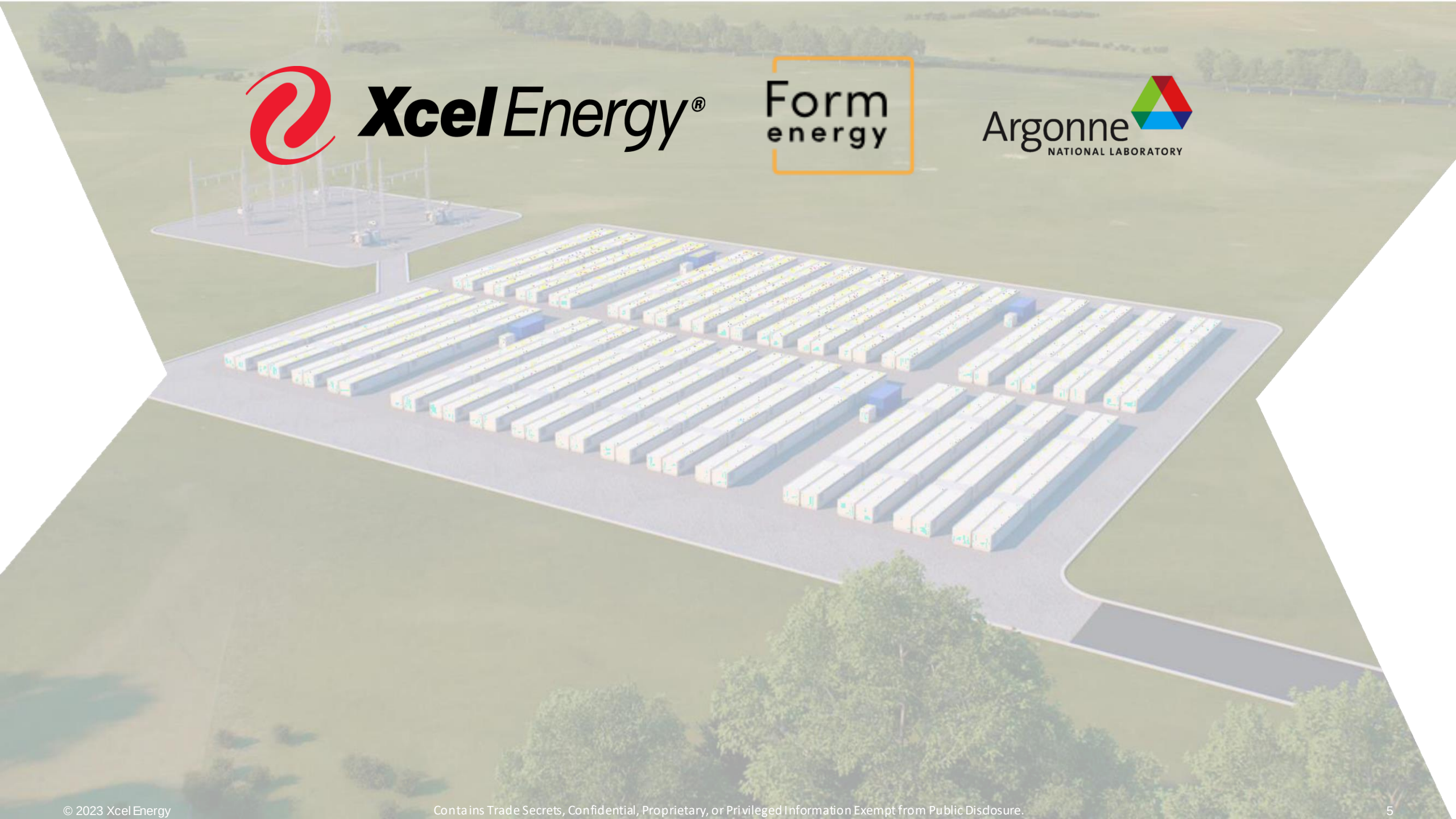


Becker, Minnesota

- Population: 5,000
- Sherco 2,200 MW coal generation plant retires 2030
- Master Plan – framework & vision for future economic development in Becker



Renewable Generation at Proposed Project Sites (MW)					
Coal Retirements		2023		2030	
		Wind	Solar	Wind	Solar
Sherco	2200	0	0	1,350	1,450
Comanche	1100	200	1,100	3,500	3,000



Next Steps & Opportunities for Engagement

Next Steps

- **Award Negotiations:** DOE OCED will commence negotiations with project selectees.
- **After Award:** ***IF the projects are given an award***
  - Selectees enter into cooperative agreement with DOE OCED for Phase One
  - Phase One includes Detailed Project Plans (phase anticipated to last up to a year and half)
  - Future phases subject to Go/No Go Decisions
  - OCED will work with selectees to comply with the National Environmental Policy Act (NEPA) where relevant
- **Opportunities for Engagement:**
  - Reach out to the project team in your community or OCED anytime
  - Community engagements, e.g., CBP
  - NEPA process & associated public meetings

National Environmental Policy Act

- **What is NEPA?** NEPA is a federal law that requires agencies like DOE to assess the potential environmental impacts of projects
- **Does NEPA Apply?** DOE will complete a NEPA review for the activities and may determine that the activities fall under one of the following categories:

Categorical Exclusion (CX)	Environmental Assessment (EA)	Environmental Impact Statement (EIS)

• Categories of actions that DOE has determined, by regulation, do not individually or cumulatively have a significant effect on the human environment and for which, therefore, neither an EA nor an EIS normally is required
 	
• **Categorical exclusions <u>do not involve public review/comment</u>, but are posted for public review once they are complete**
	• A brief analysis to determine whether an EIS is required
	
	• **<u>Two public review/comment periods</u>:**
	  • **Comment period and public scoping meeting after the notification of DOE's decision to prepare an EA**
	  • **Comment period and public meeting after the EA is drafted**
		• A detailed statement for major federal actions significantly affecting the human environment
		
		• **<u>Two public review/comment periods</u>:**
		  • **Comment period and public scoping meeting after the notification of the DOE's decision to prepare an EIS**
		  • **Comment period and public hearing after the EIS has been drafted**

NEPA Resources: OCED's NEPA Guide

Q&A Session

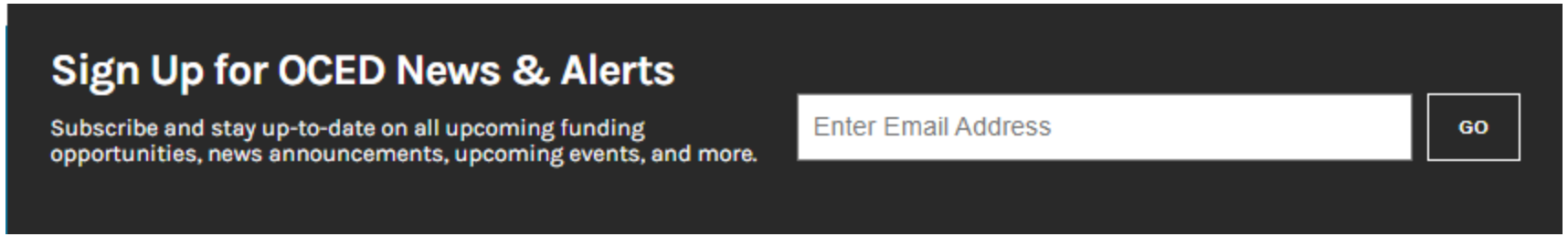
Ground Rules for Discussion

- Submit questions using the Q&A feature.
  - You can also see and upvote other questions that have been asked.
- Reserve judgement (no criticism)
- One idea at a time
- It is okay to build on the ideas of others
- Clarifying questions are okay

For More Information

- To reach DOE OCED about the LDES projects:
  - Email: **OCED_LDES@hq.doe.gov**

- Subscribe to receive OCED news and updates, including new funding opportunities – visit https://www.energy.gov/oced/ and scroll to the bottom to sign up.



Project Emails - Midwest

- If you have questions about specific projects, please reach out to DOE OCED via the project inbox directly:

Project Name	Location(s)	Email
Columbia Energy Storage	Paradee, WI	COLUMBIA_LDES@hq.doe.gov
CARES	Red Lake Nation, MN	CARES_LDES@hq.doe.gov
MIND	Becker, MN	MIND_LDES@hq.doe.gov
REVIVE	Toledo and Waukon, IA	REVIVE_LDES@hq.doe.gov
FUZES	Manitowoc County, WI	FUZES_LDES@hq.doe.gov

Project Contacts (Team leads)

Company	Point of Contact	Email
Rejoule	Tobias Hecht	thecht@rejouleenergy.com
NRCO	Michael Keyser	Michael.Keyser@nrco.coop
NextEra	Jeffrey Plew	jeffrey.plew@nexteraenergy.com
Alliant	Michael Bremel	MichaelBremel@alliantenergy.com
Northern States Energy (Xcel)	Kathryn Valdez	Kathryn.Valdez@xcelenergy.com

Resources

- LDES Program
  - OCED_LDES.pdf (energy.gov)
  - LDES Selections for Award Negotiations | Department of Energy
  - Long Duration Energy Storage - Pathways to Commercial Liftoff
- Justice40 Initiative
  - https://www.energy.gov/diversity/justice40-initiative
- Energy Justice Dashboard (BETA)
  - https://energyjustice.egs.anl.gov/
- Climate and Economic Justice Screening Tool
  - https://screeningtool.geoplatform.gov/en/#3/33.47/-97.5

Thank you!

OCED

Office of Clean Energy Demonstrations

For more information, please visit energy.gov/OCED